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can tend to excite them, as public as possible. That which forms the subject of this paper, is as yet known to very few, and perhaps may have been the cause of the loss of many useful members of society, without being suspected.

Theory of the Detonation and Explosion of Gunpowder. By the author of the former paper.

Journal de Physique, tom. 55.

These two phenomena, which take place at the same instant, arise from different causes. The detonation is the noise that is produced by the combination of two parts of inflammable air, and one of oxygen gas.

The explosion, or discharge, is produced by the water of the nitre, and that which results from the decomposition of the two gasses, which being expanded by the fire, occupies fourteen thousand times the space it did before; and acts in the same manner as compressed air, to which its elasticity is restored, and the explosive effect of which is produced without detonation.

The inflammation of gunpowder by means of a spark, arises from the ignition of the nitre and brimstone.

The inflammable gas is produced by the decomposition of the charcoal; and the oxygen gas arises from part of the nitre, which is decomposed by the fire.

After the explosion of gunpowder, we find the inside of the gun-barrel coated with a mixture of alkaline sulphuret and charcoal not decomposed. This alkaline mixture attracts the moisture of the air, and forms a greasy coating within the barrel; and on discharging the piece, it kindles, and produces what is termed hanging fire. The barrel of a fowling-piece, therefore, should never be used a second day without cleaning.

Observations. The approach of the shooting season will render the contents of this paper interesting to many readers of the Magazine. The caution at the end will be found very useful, and may prevent many bad accidents.

Description of a process by which Potash and Soda may be metallized without the assistance of iron. By M. F. R. Curaudau.

Journal de Physique, An. 1808.

If, according to the process of Mr.

Davy, potash and soda be metallic oxides, is it not more probable, that the prussic calcinations are simply the combination of this metal with charcoal? Such at least was my opinion, at the time of making my experiments, and it will appear how far it was well-founded, since I have accomplished the metallization of potash and of soda, by heating strongly the alkali with charcoal, a process which it is obvious ranks among the Prussic calcinations.

The metallization of potash or soda takes place with either of the two following mixtures, which succeed as well in stone retorts as in iron tubes; the first or second process may be employed indifferently. I prefer iron vessels, however, because they are more permeable to caloric, and less subject to fusion than the stone ware, particularly when the latter is penetrated with alkali; an inconvenience that prevents the operation from being continued to the end, which does not happen so frequently with iron.

Process the first.

Mix intimately four parts of animal charcoal, well powdered, with three of carbonate of soda, dried on the fire, without having been fused, and mix the whole with a sufficient quantity of linseed oil, but not so as to form a paste.

Process the second.

Take two parts of flour, and mix them intimately with one part of soda, prepared as in the preceding process, and add to this mixture as much linseed oil as it will bear without ceasing to be pulverulent.

Whatever be the kind of vessel employed to calcine this matter, and whether it be the first or second mixture, we must always begin with heating it gradually; but as soon as the matter is obscurely red, the fire may be increased, till a fine sky-blue light, surrounded with a greenish aureola, is perceived in the interior of the retort or iron tube. To this light will soon succeed a very copious vapour, which obscures all the interior of the vessel. This is the metal which is disengaged from the mixture. The fire must then be urged no farther, for at this temperature the retort begins to fuse; and if the iron resists better, it is because

the alkali penetrates it less readily than it does the stone ware, and likewise because the heat it receives is so ner transmitted to the matter within.

To collect the metal in proportion as it forms, introduce into the vacant part of the apparatus a rod of iron, well cleaned, and as it must not have time to grow red-hot, take it out again in four or five seconds; it will then be found covered with metal, to remove which the rod is to be plunged instantly into a glass cucurbit filled with essence of turpentine. This cucurbit should be immersed in a tub of water, to prevent the essence from boiling; and notwithstanding this precaution, it will be heated so much sometimes as to take fire on the immersion of the iron rod.

To execute these processes well, three persons are necessary. One should take care of the fire, and work the bellows. The most active should collect the metal as it is produced, and with the utmost celerity plunge the iron rods into the essence. The third must separate the metal that is on the rods; and then plunge them into water, not only to cool them, but also to remove the alkali that may have escaped metallization, or have been formed by combustion previous to the immersion of the metal in the essence of turpentine. He must likewise take care to wipe the rods perfectly dry, that he who collects the metal may have nothing else to do.

These processes, while the metal is producing, requires in the operation a dexterity not inferior to the celerity I have recommended. The attention of him who manages the bellows is also an object of no little importance, for if he suffers the fire to slacken, the metal will immediately cease to be disengaged, and the rods will be covered with nothing but pure alkali. On the contrary, if he encreases the fire at this period of the process, the apparatus will melt, and the experiment fail. This proves how high but uniform the temperature must be. I have observed that the metal is always produced at the heat of melting iron. Accordingly an iron tube will seldom serve twice, and retorts always melt before the whole of the metal is obtained.

I think I may conclude from my experiments, that the production of the metal

is not owing, as has been said, to the disoxygenation of the alkali; but that it is a new compound, in which hydrogen appears to have entered into combination, and I conceive in a state of great condensation.

Be this as it may, during the whole of the operation, hydrogen, alkali not converted into metal, and prussic radical in the state of gas, continue to be disengaged. The last in particular I have collected in pretty considerable quantity.

These results tend to prove that hydrogen is one of the component parts of the alkalis, the extrication of which is promoted by the charcoal; or that charcoal itself is a compound, one of the principles of which is hydrogen. There is no alternative but one or the other of these hypotheses.

Observations on the nature of the new properties of Alkaline Metals. By the author of the former paper.

Same Work.

Several of the phenomena that accompany the metallization of potash and soda, appearing to me inexplicable on the hypothesis of the alkalis being simply disoxygenised: and this theory besides agreeing neither with the properties of the oxygen, nor with those of ammonia, the principles of which should be analogous to those of potash and soda, I could not join in opinion with those chemists, who conceive the metallization of potash and soda to be merely the result of the disoxygenation of these substances. On the contrary, without prejudging any thing, I would only consider the facts; with this view I performed the following experiments.

Exp. 1. To prove the presence of carbon in the alkaline metals it was necessary to have recourse to the action of a substance, with which the alkalis have more affinity, than they have with the principles which constitute the metals, and which at the same time should be incapable of furnishing any element that would combine with those I sought to separate from the metalized alkalis.

Silex, from its indestructibility, the state of purity in which it is attainable, and particularly its affinity for the alkalis, appeared to me to unite all th